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**Center for Environmental Policy,
Economics and Science**

FACILITATING THE FLOW OF CAPITAL TO THE POLLUTION PREVENTION INDUSTRY

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I. INTRODUCTION

The commercialization of pollution prevention (P2) technologies, products and services is critical to the development of an industrial structure that is both economically viable and ecologically sustainable.¹ As market demand for P2 technologies grows, there are expanding opportunities for P2 firms to generate sales, profit and shareholder wealth. However, many P2 firms are not reaching their potential because they find it difficult to raise the necessary startup and growth capital.

The purpose of this report is to explore ways in which third parties might facilitate the flow of private investment capital to P2 companies. The report begins with an analysis of the reasons that P2 firms currently are *not* financed, and then proceeds to identify roles for third parties based on this analysis. The resulting recommendations therefore focus on ways that third parties might address different kinds of barriers to capital flow.

This report builds upon and adds to research summarized in a companion report entitled, *Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms*. In that report, the Center presented an analysis of what individual, corporate and institutional investors look for and what they avoid when deciding to invest in pollution prevention and other environmental firms. In the first part of this report (Section II), the Center takes the investor-preference research a step further by comparing investor preferences with what P2 firms actually offer, and reports the finding of significant discrepancies. In further research, also summarized in Section II, the Center describes market and regulatory barriers which, according to P2 firms, adversely affect their profits and growth, rendering them less attractive to investors.

Finally, Section III of this report uses these findings to identify promising opportunities for business development organizations, environmental regulatory and technology transfer agencies and other third parties to positively affect the rate and magnitude of private investment in P2 firms.

IA. Methodology

The Center began with investor preference data (also compiled by the Center) summarized in a companion report entitled, "Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms."²

¹ For purposes of this report, the pollution prevention industry is defined as developers, producers, and providers of technology, products and services that result in reduced on-site pollution generation. Pollution may be reduced through improved production and processing technologies and methods, improved energy efficiencies, substitution away from toxic or hazardous materials, material reuse, or resource conservation.

² McCabe, Loch. Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms. Center for Environmental Policy, Economics and Science (Ann Arbor, Michigan). November, 1996.

The Center then gathered information about the capital needs of 64 P2 firms. To do so, the Center first mailed a "Company Capital Resources and Needs" information request form (see Appendix A) to approximately 450 companies listed on the "P2 Vendor" data base maintained at the University of Wisconsin. Usable responses from 31 companies were received, a response rate of nearly 6%.

Responding companies described:

- (1) The degree of challenge ("Very Easy" to "Very Difficult") in raising debt and equity capital,
- (2) The firm's business structure and the type of financing sought, using more than 160 *objective* characteristics pre-grouped into 18 Business Description/ Financing Sought categories (In most instances, companies checked one characteristic per category); and
- (3) How well investors *subjectively* "judged your firm's viability or potential" (from "Very Positive" to "Very Negative").

The Center then supplemented its data base with equivalent objective and subjective information on 33 P2 firms provided by the Center's Environmental Capital Network program³. Data records on P2 companies supplied by the Environmental Capital Network did not describe the degree of challenge in raising capital.

To allow for a meaningful comparison of P2 firms with investor preferences, P2 firms were stratified into two groups: 38 early-stage ("ES") companies and 26 later-stage ("LS") companies. This early/late stage dichotomy corresponds to a similar breakdown among investors -- i.e. early- vs. later-stage investors. For purposes of this analysis early-stage companies are firms with annual sales of less than \$1 million, while later-stage companies have annual sales of greater than \$1 million.

As the initial analysis indicated that the growth and profitability of many P2 firms were lower than what most investors sought, the Center conducted an additional follow-up survey of participating P2 firms and asked two open-ended questions:

- What are the primary barriers to growth and profitability faced by your firm?
- What are the primary suggestions you have for a third party to mitigate these barriers?

The Center approached 35 P2 firms by telephone and 21 companies provided responses.

I.B. Limitations of this Study

The findings of this study are based upon exploratory research and should be considered preliminary. Study participants represent a small sample of the overall P2 industry. Additional research using larger sample sizes could alter these findings.

³ The Environmental Capital Network program is a service that introduces environmental companies to potential investors.

I.C. Acknowledgments

The Center would like to extend its appreciation to the U.S. Environmental Protection Agency (EPA) Office of Pollution Prevention and Toxics (OPPT) which provided funding to make this research and report possible.

On November 15, 1993, Erskine B. Bowles, then Administrator of the Small Business Association, and Carol M. Browner, Administrator of EPA signed a Memorandum of Understanding to “ensure that the U.S. Government effectively encourages, supports and enables U.S. small businesses to develop, market, and/or adopt cost-effective environmental (including pollution prevention) technologies to achieve economic growth and environmental compliance.”

In addition to the present study, the Office of Pollution Prevention and Toxics has initiated several other projects which support the goals of the Memorandum of Understanding.

The Center is very grateful to Ed Weiler of OPPT for his excellent input to the development of this report. The Center also thanks the many other individuals who generously contributed their time to provide information for this research.

I.D. Disclaimer

This report should not be relied upon as legal or securities advice. The summary nature of the report yields generalizations that will not apply to all businesses, organizations or individuals. In addition, the data used and the analysis conducted is believed to be accurate, but neither the Center for Environmental Policy, Economics and Science, nor the U.S. EPA guarantee the accuracy of the data or results, nor do they assume any liability for any loss resulting from, or occurring in connection with, the use of information contained, described, disclosed or referenced in this report.

II. HOW WELL ARE P2 FIRMS POSITIONED TO RAISE CAPITAL?

When asked, two thirds of responding P2 firms indicated that they would "definitely" or "probably" seek growth capital by the end of 1997. At first glance, these capital-raising efforts would seem likely to be successful, given certain characteristics of the P2 industry that ought to make it particularly attractive to investors:

- The P2 industry market size is growing rapidly. A single sector of this industry -- technology and equipment -- grew from \$400 million in 1990 to \$900 million in 1995, and has been projected to grow by \$200 million per year between 1996 and 1998. This sector alone has been further projected to expand to \$1.7 billion by the year 2000.⁴
- Some P2 technologies have broad applications in other non-P2 industries.
- The P2 industry structure is highly fragmented, with few market leaders in place, increasing the potential for strong firms emerging today to dominate a market in the future.
- Investors are being advised by industry experts to focus on prospect firms with environmental technologies, products and services that **both** save and make money for the customer, and to turn away from firms that merely reduce a customer's liability and regulatory burden.⁵

However, notwithstanding these factors, roughly half of the responding P2 firms reported that they found it "difficult" or "very difficult" to raise equity or debt capital.

Seeking to explain this difficulty, the Center began with the assumption that it was due to the fact that, on an individual basis, many P2 firms do not offer what investors wanted. Comparison of investor preference data with data on what P2 firms actually offer strongly bore out this assumption. Specifically, the Center found that **many P2 firms have a difficult time raising capital because they do not offer the revenues, profits, and potential that most investors find attractive**. Wanting to understand better why many P2 firms do not offer investors more, the Center further found that **P2 firms face a range of market and regulatory barriers**, above and beyond those faced by most firms, which may decrease revenues, increase costs, lower profits, and increase investor risk.

II.A. Many P2 Firms Fall Short of What Investors Seek

Generally speaking, investors are risk averse and focus on companies that have strong revenue, profit and growth potential. A primary barrier to capital flowing to the P2 industry is that many P2 companies simply fall short of what most investors look for - i.e. the potential reward to justify the risk.

⁴ Estimated from data published in the Environmental Business Journal. Environmental Business International Inc. San Diego, CA. Vol. IX, No. 4/5 April/May 1996.

⁵ Holman, Hugh. "Rachel Carson, Meet Adam Smith" ECA Reports. (Newsletter of the Environmental Capital Associates, Baltimore, Maryland - (410) 235-4526). March 31, 1996.

Later-stage P2 Firms: Many, if not most, later-stage P2 firms have current revenues and profits, and future growth and return on investment expectations that are less robust than those sought by most investors. As shown in Table 1, less than a third of later-stage P2 firms had the track record or potential that a significant majority of later-stage investors seek.

Furthermore, as shown in Table 2, only a quarter to half of later-stage P2 firms indicated that investors are "very positive" about one or more several critical subjective criteria that most investors "strongly consider" when evaluating a firm's viability and potential. In other words, a majority of later-stage P2 companies reported investors to have doubts about their management team, market potential, track record, or profit potential.

Early-stage P2 Firms: Unlike many later-stage P2 firms, many early-stage P2 companies raising capital do offer characteristics that are attractive to most early stage investors (note that many early-stage firms do not, by definition, have a significant track record). As shown in Table 3, most early-stage P2 firms participating in the study offer the potential, the deal and the exit strategy favored by most early-stage investors.

Yet, despite the high investor-P2 firm correspondence of these *objective* characteristics, most early-stage P2 firms report investors are not "very positive" about the key *subjective* characteristics of market potential, market need, management team, business plan, and profit potential.

The Center is not surprised by these findings. Based upon the Center's on-going experience with the Environmental Capital Network project, it appears that many P2 firms could significantly benefit from more in-depth market understanding, product focus, marketing capabilities and resources, business planning and management capabilities.

Table 1. Later Stage - Objective Characteristics: What LS Investors "Look For" vs. What LS P2 Firms Offer

Business Description & Financing Categories	Characteristic(1)	% of LS Investors Who Look for this Characteristic	% of LS P2 Firms That Offer this Characteristic	Degree of Correspondence (2)	Characteristic Offered by Most LS P2 Firms - If Different From What Most Investors Seek (% of LS Firms)
Track Record					
Revenues Last 12 Mths	\$5-20 million	70%	31%	-	\$1-5 million (69%)
Profits Last 12 Months	\$500,000 or more	60%	15%	-	Less than \$100,000 (60%)
Potential					
5-Year Revenues	\$30 million plus	65%	16%	-	\$10 million or less (51%)
Cash Flow Break Even	Within 1 Year	65%	36%	-	1-3 Years (64%)
Annual Investor Returns	30% or more	60%	47%	-	30% or less (63%)
The Deal					
Amount of Capital Sought	\$1-10 million	60%	37%	low	\$1 million or less (63%)
Purpose of Capital (3)	Expansion, working capital	75%	75%	high	-
Capital Use (3)	Equipment	60%	40%	low	Working capital (57%)
The Exit Strategy					
Cash Out Period	3-5 Years	85%	50%	-	3-5 Years (50%)
Cash Out Method (3)	IPO	75%	13%	-	Re-finance (35%)
	Acquisition	65%	47%	medium	External Buyer (47%)

- (1) Investors could "Look For" more than one characteristic per category. Data from Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms, Center for Environmental Policy, Economics and Science, November, 1996.
- (2) Key: High correspondence (0-5% spread); Medium correspondence (6-15% spread); Low correspondence (16-25% spread); Insignificant correspondence (greater than 25% spread).
- (3) Companies could indicate that they offer more than one characteristic in this category.

Table 2. Later Stage - Subjective Characteristics: What LS Investors "Strongly Consider" vs. What LS P2 Firms Say Investors Find "Very Positive"

Subjective Characteristics	% of LS Investors who "Strongly Consider" this Characteristic (1)	% of LS P2 Firms Reporting Investors Evaluate Characteristic as "Very Positive"	Degree of Correspondence (2)
Management Team	90%	40%	-
Market Need	80%	50%	-
Market Potential	80%	40%	-
Track Record	70%	30%	-
Business Plan	55%	25%	-
Profit Potential	80%	24%	-

- (1) Investors could indicate that they "Look For" more than one characteristic per category. Data from Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms, Center for Environmental Policy, Economics and Science, November, 1996.

- (2) Key: High correspondence (0-5% spread); Medium correspondence (6-15% spread); Low correspondence (16-25% spread); Insignificant correspondence (greater than 25% spread).

Table 3. Early Stage - Objective Characteristics: What ES Investors "Look For" vs. What ES P2 Firms Offer

Business Description & Financing Categories	Characteristic (1)	% of ES Investors who Look For this Characteristic	% of ES P2 Firms That Offer this Characteristic	Degree of Correspondence (2)	Characteristic Offered by Most ES P2 Firms - If Different from What Most Investors Seek (% of ES Firms)
Potential					
5-Year Projected Rev.	\$10 million plus	70%	63%	medium	—
Cash Flow Break-even	Within 3 years	80%	47%	-	3 years plus (50%)
Annual Rate of Return	20% or more	65%	76%	medium	—
The Deal					
Capital Sought	\$0.5 to 5 million	60%	65%	high	—
Purpose of Capital (3)	Startup, expansion, & working capital	75%	65%	medium	—
Use of Capital (3)	Marketing/Sales	65%	64%	high	—
	Working capital	60%	76%	medium	—
Investor Role (3)	Board of Directors	65%	71%	medium	—
	Consulting	60%	45%	medium	—
The Exit Strategy					
Cash Out Period	1-5 Years	75%	63%	medium	—
Cash Out Method (3)	IPO	80%	72%	medium	—
	Acquisition	70%	25%	-	—

- (1) Investors could "Look For" more than one characteristic per category. Data from Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms, Center for Environmental Policy, Economics and Science, November, 1996.
- (2) Key: High correspondence (0-5% spread); Medium correspondence (6-15% spread); Low correspondence (16-25% spread); Insignificant correspondence (greater than 25% spread).
- (3) Companies could indicate that they offer more than one characteristic in this category.

Table 4. Early Stage - Subjective Characteristics: What ES Investors "Strongly Consider" vs. What ES P2 Firms Say Investors Find "Very Positive"

Subjective Characteristics	% of ES Investors that "Strongly Consider" this Characteristic (1)	% of ES P2 Firms Reporting Investors Evaluate Characteristic as "Very Positive"	Degree of Correspondence (2)
Market Potential	85%	50%	-
Market Need	85%	50%	-
Management Team	80%	40%	-
Business Plan	60%	30%	-
Profit Potential	70%	20%	-

- (1) Investors could indicate that they "Look For" more than one characteristic per category. Data from Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms, Center for Environmental Policy, Economics and Science, November, 1996.

- (2) Key: High correspondence (0-5% spread); Medium correspondence (6-15% spread); Low correspondence (16-25% spread); Insignificant correspondence (greater than 25% spread).

II.B. Most P2 Firms Face Significant External Barriers to Growth and Profitability

The analysis so far suggests that the receptivity of investors to P2 firms is heavily influenced by a firm's ability to sell to customers, increase sales, lower costs and generate profits. Firms in the pollution prevention industry, however, like firms in many other environmentally related industries, are subject to external factors that indirectly affect the ability of the firm to meet the market need, market potential, and profit potential that investors seek.

In a follow-up telephone survey, 21 P2 companies described the most significant external barriers they face to increasing their growth and profitability. The barriers cited, along with the type of impact the barriers have upon the firm's ability to increase revenues and lower costs, are summarized in Table 5.

Table 5. Major External Barriers to Growth and Profitability

Barriers Mentioned (Number of times mentioned)	Impact of Barrier on P2 Firm	% of Responses
Regulators are slow to accept new P2 technologies and products (5)	Increases firms short-term costs and lowers short-term revenues. Increases R&D risk.	15%
Customer lacks capital for purchase (4)	Reduces revenues as customers view P2 as a discretionary expenditure.	12%
Customer needs education or training (4)	Increases real customer costs and puts P2 firm at competitive disadvantage.	12%
Customer ignores relevant regulations (4)	Reduces effective market size and increases firms marketing costs.	12%
Regulations are unclear and/or changing (4)	Reduces effective market size and increases marketing costs. May also increase R&D risk.	12%
Customer uses "low bid" procurement practices (3)	Reduces revenues for superior P2 technologies that do not enjoy full economies of scale.	9%
Uneven enforcement of environmental regulations (2)	Reduces effective market size and increases marketing costs.	6%

Nearly all emerging and expanding firms face some market barriers such as competition, lack of economies of scale, and customer education. Yet it is clear that many P2 firms operate in a regulatory context that erects additional barriers to profitability and growth. Ironically, while many P2 firms operate and direct their efforts specifically in response to environmental regulations, regulations that are slow to accept new technologies, as well as those which are unclear, changed, or unenforced, hinder the ability of P2 firms to prosper.

III. OPPORTUNITIES FOR THIRD PARTIES TO FACILITATE THE FLOW OF CAPITAL TO P2 FIRMS

III.A. Enhancing Business Planning and Business Plans

Given the high degree of mis-match between what most investors seek and what many P2 firms offer, business development organizations can play an important role in working directly with P2 firms to improve their business strategy and business plans.

III.A.1 *The Business Strategy*

Third parties can enhance the business and its business strategy to make the firm more attractive to more investors. The findings suggest that many P2 firms will be better positioned to raise capital as they concentrate on building demand-driven businesses that have:

- (1) Very large markets,
- (2) Strong customer needs,
- (3) Experienced and capable management teams, and
- (4) Production and pricing structures that increase the probability that the firm will grow and be profitable.

These factors are critical to raising capital, and will often far overshadow the "worthiness" or "positive environmental impact" of a firm's product, technology or service.

III.A.2 *The Business Plan*

Third parties can also help P2 firms to develop more compelling business plans - plans required for investors to understand how much capital is needed, how it will be used, and why it will help the business succeed.

The currency and completeness of a firm's business plan are particularly critical factors. The Center found that more than 90% of investors prefer a "complete and current" business plan.⁶ Yet only one-fifth of early-stage P2 firms and one third of later-stage P2 firms looking for capital within the next year reported that their business plans were "complete and current."⁷

The quality of the business plan is also vital. Nearly 70% of early-stage investors and 50% of later-stage investors "strongly consider" a firm's business plan. Yet, only 30% of early-stage P2 firms and less than 25% of later-stage firms reported that their plan was considered to be "very positive" by investors.

⁶ A large majority of investors avoid firms that have no business plan or are creating a plan. McCabe, Loch. Pollution Prevention Venture Capital: What Investors Consider in Pollution Prevention Firms. p. 5.

⁷ These results were compiled from responses of the 31 P2 firms that responded in a random manner to the Center's mailing to P2 firms listed on the "P2 Vendor" data base (see I.A. Methodology).

Third parties can work with P2 companies to develop plans that are simple, include all relevant information while minimizing extraneous information, and provide an overview of the business, the amount of funding requested, the use of the funds, the management team, and a summary of current and projected financial information.⁸

Finally, third parties can provide business training, market research, and management networking services to help P2 firms develop stronger products, customer bases and management teams.

III.B. Mitigating External Barriers to Growth and Profitability

As indicated in the methodology section, the P2 firms that were asked to describe external barriers to growth and profitability were also asked to suggest approaches to reduce those barriers. The three most frequently cited suggestions are shown in Table 6.

From the perspective of the P2 firm and potential investors, each of these suggestions has the potential to increase revenues, lower costs, generate profits, and reduce investor risk - thereby increasing the attractiveness of investing in the P2 industry.

⁸ Hall, John and Hofer, Charles W. "Venture Capitalists' Decision Criteria in New Venture Evaluation" *Journal of Business Venturing*. No. 8. (New York, NY), 1993. p. 40.

Table 6. Suggestions by P2 Firms to Mitigate External Barriers to Profitability and Growth

Suggestions Mentioned (Times mentioned)	Impact of Suggestion on P2 Firm	% of Suggestions
More consistent enforcement of environmental regulations (5)	Increases effective market size and reduces customers' discretionary perceptions of P2.	23%
Develop performance-based regulations and contracts that incrementally reward greater environmental results (5)	Increases opportunities to successfully commercialize emerging technologies that have superior environmental performance. Reduces R&D risk.	23%
Enhance customer access to objective information sources (3)	Increases customer confidence and reduces education/training expense. Accelerates sales and reduces firm's marketing costs.	14%

Other suggestions given included facilitating the use of new P2 technologies and products by streamlining and standardizing permitting processes at the federal and state levels, and building stronger industry-government coalitions to accelerate acceptance of new technologies.

Part IV. CONCLUSIONS

The Center has found that a combination of direct capital and indirect marketing and regulatory barriers inhibit the flow of capital to P2 companies by simultaneously increasing the risk and reducing the reward of investment in them. The Center's research suggests that opportunities for third parties to directly enhance the ability of P2 firms to raise capital include:

- Assisting them in developing effective business strategies and compelling business plans,
- Enforcing existing environmental regulations,
- Developing performance-based regulations and contracts which favor technologies that yield greater environmental results, and by
- Enhancing access to objective information about P2 technologies.

These findings are preliminary. It is our hope, nonetheless, that they will help P2 firms better position themselves to more effectively raise capital, thereby resulting in an augmented availability of P2 technologies.

APPENDIX A